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USDA Forest Service

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## Breeding Birds in Uncut Aspen and 6- to 10-Year-Old Clearcuts in Southwestern Colorado

Virgil E. Scott<sup>1</sup> and Glenn L. Crouch<sup>2</sup>

Numbers of breeding birds were estimated for various sizes and ages of clearcuts, for edge habitat created by the clearcuts, leave strips between clearcuts, and uncut aspen forest (controls). Total numbers of birds were not different among three size classes or five age classes of clearcuts. Totals were lower on clearcuts than on edges but not different from controls or leave strips.

**Keywords:** aspen, clearcutting, birds

### Introduction

Aspen (*Populus tremuloides*) is the only commercially important nonconiferous tree species in the central Rocky Mountains. Although aspen has had little market potential in the West, demand is increasing. About 4 million acres of commercial aspen occur within the Rocky Mountain region; 3 million acres are in Colorado (Wengert 1976).

In the western United States, aspen is a component of many forest types; as the predominant species, it rarely covers extensive areas, except in Colorado and Utah (Daniel 1979). The importance of aspen communities for birds has been documented by Flack (1976), Salt (1957), and Winternitz (1976).

Aspen normally reproduces vegetatively by root suckers in stands that have been opened by fire, windthrow, or cutting (DeByle 1976). It is intolerant of shade; regeneration may be inhibited by leaving trees standing after harvest. Aspen commonly is harvested by clearcutting, which usually promotes regeneration by suckering. DeByle (1981) reported an increase in the number of bird species but decreases in the total number of individuals after clearcutting on a 10-acre plot in Utah, but little other information has been published regarding bird response to commercial clearcutting of aspen in the West.

<sup>1</sup>Research Wildlife Biologist, Retired, Denver Wildlife Research Center, Ecology Branch, Fort Collins, Colo.

<sup>2</sup>Research Wildlife Biologist, Rocky Mountain Forest and Range Experiment Station. Headquarters is in Fort Collins, in cooperation with Colorado State University.

We therefore compared bird densities in different clearcut size-classes, among five clearcut age classes, with those in habitats along the edges of clearcuts, strips of habitat between clearcuts, and uncut aspen. An earlier, less detailed paper described avian activity on the same study area 1 to 5 years after the clearcut harvest (Scott and Crouch 1987).

### Study Area

The study area was located in the West Stoner aspen sale area (a mosaic of aspen forest with clearcuts) on the Dolores District of the San Juan National Forest, 25 miles northeast of Dolores, Colo. Elevations range from 9,000 to 10,000 feet, and topography is mostly gentle. The site is occupied by a nearly pure stand of mature aspen (Crouch 1983). Small meadows (10% of the area) are interspersed throughout. Aspen was clearcut in patches ranging from 3 to 20 acres, from 1974 through 1978. About 600 acres (25% of the sale area) were harvested, mostly in 1977 and 1978. Subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) trees composed about 1% of the stands before logging, and those within the clearcuts were left standing.

### Methods

Numbers of breeding birds were estimated in four overstory categories, including various sizes and ages



of clearcuts, edge habitat created by clearcuts, leave strips between clearcuts, and uncut forest. To inventory birds, we used a point-count technique with a fixed observation radius of 100 feet. One point-count plot was established at the center of each of 30 clearcuts; 10 in each of three size classes (small  $\bar{x} = 4.4$  acres  $\pm 0.4$ , medium  $\bar{x} = 8.9$  acres  $\pm 0.6$ , and large  $\bar{x} = 14.1$  acres  $\pm 1.0$ ). Two of the 10 harvests in each of the three size classes had been cut each winter from 1974–75 to 1978–79.

One point-count plot, half in the clearcut and half in aspen, was established at the edge of each clearcut, and  $\geq 100$  feet from the clearcuts in the adjacent leave strips. Thirty point-count plots also were established in uncut aspen stands outside the sale area to serve as controls. Birds were counted twice on all plots between June 12 and July 2, 1984, between sunrise and 3 hours after sunrise. Differences ( $P = 0.05$ ) among overstory categories, and size and age of clearcuts were compared with analysis of variance, using the number of individual birds observed at each plot as one observation. Differences among overstory categories were tested with a Newman-Keuls test (Snedecor and Cochran 1980). Statistics were computed using MUSTAT (Lund 1985). Species of birds observed beyond the 100-foot radius, and those with few observations and not included in the density estimates, are indicated by an asterisk in appendix I.

Diversity profiles for birds were prepared following Patil and Taillie (1979). They were interpreted using the criterion that lines in the profile that are separated and do not cross indicate a difference in diversity, whereas those lines that are close together or cross indicate no difference.

## Results and Discussion

### Clearcut Age and Size Class Comparisons

Solitary vireos<sup>3</sup> were more numerous on the 10-year-old clearcuts than on 6-, 7-, and 8-year-old clearcuts (table 1). No differences were detected for any other individual bird species among age or size class of clearcuts (tables 1 and 2). Hermit thrushes, which usually inhabit mature forests (Szaro and Balda 1979), were counted on the 9- and 10-year-old but not on the younger clearcuts. Total bird densities were not different among age or size classes of clearcuts.

### Clearcut, Edge, Leave Strip, and Control Comparisons

Song sparrows and white-crowned sparrows prefer forest edges, clearings, or low brushy fields (Udvardy 1977), and were more numerous on the clearcuts and edges than on controls or leave strips (table 3). Broad-tailed hummingbirds also were more numerous in clearcuts than on sites in other overstory categories. Numbers of solitary vireos, which inhabited the older-age clear-

<sup>3</sup>Scientific names of birds are shown in appendix 1.

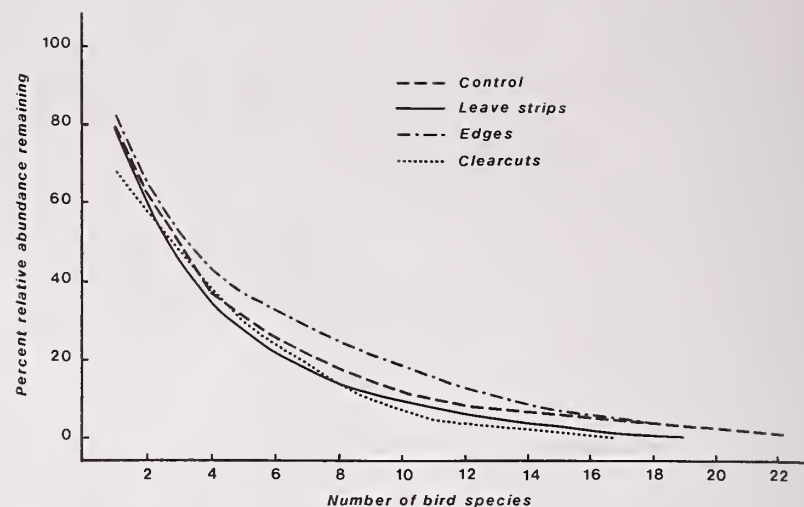


Figure 1.—Species diversity profile of bird communities in controls, leave strips, edges, and clearcuts, Stoner Mesa, Colo.

cuts, were not different among overstory categories. Total bird density was higher on edge habitat than on clearcuts, but not different from controls or leave strips.

Fewer cavity-nesting birds were observed on clearcuts (6% of birds), compared with controls (33%), leave strips (34%), and edges (39%). Although house wrens were the most numerous cavity nesters on clearcuts (they sometimes nest in slash/brushpiles or fallen trees with holes (Thomas 1979)), they were still less numerous on clearcuts than on leave strips and controls. In this study, swallows (violet-green and tree) were recorded only when perched, even though many swallows were observed foraging above the clearcuts. More swallows were recorded at edges than in other habitats. At edges, swallows usually perched or nested in dead aspen trees. Purple martins also foraged above clearcuts, and several were observed while perched in trees near the clearcuts but beyond the 100-foot sampling radius.

Fewer yellow-rumped warblers and warbling vireos (birds that nest and feed in the canopy) were counted on clearcuts than in other overstory habitats. Numbers of yellow-rumped warblers and warbling vireos were not different among controls, leave strips, or edges, but MacGillivray's warblers, which are usually found in shrubby habitats, were not seen on the controls.

The diversity profile (fig. 1) indicated that bird diversity was greater on edge habitat (23 species) than on clearcuts (17 species) or leave strips (19 species). The diversity between edges and controls (23 species) was not different, but the measure of evenness (as indicated by the diversity profile) was greater for edges, at least among 16 of the most abundant species.

## Conclusions

Effects of clearcutting on bird abundance and composition in aspen appear to be temporary if regeneration is prompt. Within 10 years, for example, saplings in the older clearcuts provided habitat for hermit thrushes, which usually are associated with mature forests. Birds such as broad-tailed hummingbirds, solitary vireos, and song and white-crowned sparrows were more numerous on the clearcuts than on the controls or leave strips, but

Table 1.—Mean densities (no./100 acres) and standard error (S.E.) of birds according to year classes of clearcuts, Stoner Mesa, Colo.<sup>1</sup>

	<i>n</i> = 6 Years after cutting				
	10	9	8	7	6
Broad-tailed hummingbird	12 (12)	23 (12)	46 (31)	0 (0)	46 (23)
House wren	0 (0)	12 (12)	12 (12)	12 (12)	0 (0)
Hermit thrush	35 (20)	23 (12)	0 (0)	0 (0)	0 (0)
American robin	23 (23)	12 (12)	0 (0)	0 (0)	36 (36)
Solitary vireo	58a (11)	46ab (23)	0c (0)	12b (12)	0c (0)
MacGillivray's warbler	12 (12)	12 (12)	23 (23)	0 (0)	12 (12)
Song sparrow	23 (23)	81 (31)	116 (12)	104 (20)	58 (42)
White-crowned sparrow	0 (0)	23 (12)	23 (20)	35 (12)	46 (23)
Dark-eyed junco	0 (0)	23 (23)	35 (20)	12 (0)	23 (31)
Other birds	69 (40)	35 (20)	23 (12)	12 (12)	12 (12)
Total	232 (31)	290 (61)	278 (53)	187 (12)	233 (76)

<sup>1</sup>Within species, means followed by no letter or the same letter are not different ( $P = 0.05$ ).

Table 2.—Mean densities (no./100 acres) and standard error (S.E.) of estimated birds according to size classes of clearcuts, Stoner Mesa, Colo.<sup>1</sup>

	<i>n</i> = 10		
	Small	Medium	Large
Broad-tailed hummingbird	7 (7)	35 (11)	35 (22)
House wren	7 (7)	0 (0)	14 (9)
Hermit thrush	0 (0)	21 (14)	14 (9)
American robin	21 (14)	21 (21)	0 (0)
Solitary vireo	21 (14)	28 (17)	21 (14)
MacGillivray's warbler	21 (14)	14 (9)	0 (0)
Song sparrow	104 (22)	76 (25)	48 (21)
White-crowned sparrow	7 (7)	21 (14)	28 (11)
Dark-eyed junco	21 (21)	14 (14)	35 (11)
Other birds	28 (22)	28 (13)	35 (27)
Total	237 (41)	258 (45)	230 (40)

<sup>1</sup>Within species, means followed by no letter or the same letter are not different ( $P = 0.05$ ).



Table 3.—Mean densities of birds (no./100 acres) with standard error (S.E.) on the Stoner Mesa, Colo.

	<i>n</i> = 10			
	Controls	Leave strips	Edges	Clearcuts
Broad-tailed hummingbird	2b (2)	0b (0)	2b (2)	25a (9)
Woodpeckers (Hairy and Downy)	5 (3)	5 (5)	7 (3)	0 (0)
Northern flicker	5 (3)	12 (6)	7 (5)	2 (2)
Western wood-pewee	12 (4)	19 (8)	16 (3)	0 (0)
Flycatchers (Western and Hammond's)	12 (5)	14 (6)	5 (3)	0 (0)
Swallows (Tree and Violet-green)	2b (2)	5b (5)	34a (16)	2b (2)
Red-breasted nuthatch	14 (7)	2 (2)	5 (5)	2 (2)
House wren	62a (17)	67a (9)	53a (17)	7b (3)
Hermit thrush	12 (4)	5 (3)	14 (4)	12 (7)
American robin	19 (5)	14 (7)	12 (4)	14 (7)
Solitary vireo	2 (2)	0 (0)	14 (9)	23 (12)
Warbling vireo	39a (11)	60a (17)	69a (22)	0b (0)
Yellow-rumped warbler	37a (9)	44a (10)	26a (8)	0b (0)
MacGillivray's warbler	0 (0)	2 (2)	2 (2)	11 (4)
Song sparrow	9b (6)	23b (6)	71a (9)	77a (17)
White-crowned sparrow	2b (2)	0b (0)	0b (0)	19a (6)
Dark-eyed junco	51 (15)	37 (9)	30 (12)	26 (10)
Brown-headed cowbird	2 (2)	0 (0)	7 (5)	7 (7)
Other birds	14 (2)	12 (5)	28 (5)	14 (7)
Total	301ab (47)	321ab (17)	402a (36)	241b (18)
No. of species	23	19	22	18

<sup>1</sup>Within species, means followed by no letter or the same letter are not different ( $P = 0.05$ ).

total bird density was not different among these three overstory categories. Total bird density was higher on edges than in clearcuts, but not different from the other categories.

Cavity-nesting birds, specifically swallows and house wrens, were less numerous on clearcuts than in other habitats, as were yellow-rumped warblers and warbling vireos. Birds that prefer early successional stages, such as broad-tailed hummingbirds, MacGillivray's warblers, song sparrows, and white-crowned sparrows, should increase in numbers within clearcuts, especially after aspen regeneration is established.

Periodic clearcutting of aspen in relatively small blocks over a span of years in the same area should provide a mosaic of age classes, and could result in increased local bird diversity. The sample size for this study was limited by the availability of clearcuts by size and age class. Birds that occupy large territories and less common birds were

not sampled in numbers sufficient to determine their response to the small patch clearcutting. It is possible that raptors and other birds that require extensive stands of mature forests could have been adversely affected. Downy woodpeckers, for instance, were observed in the leave strips, but hairy woodpeckers were observed only on the controls.

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## Appendix 1

Common and scientific names of all birds observed on the Stoner Mesa study site. Nomenclature follows the check-list of North American birds, sixth edition, 1983. Birds with an asterisk were observed at distances greater than 100 feet and are not included in density estimates.

### Bird

Green-winged teal*	<i>Anas crecca</i>
Red-tailed hawk*	<i>Buteo jamaicensis</i>
Broad-tailed hummingbird	<i>Selasphorus platycercus</i>
Yellow-bellied sapsucker*	<i>Sphyrapicus varius</i>
Downy woodpecker	<i>Picoides pubescens</i>
Hairy woodpecker	<i>Picoides villosus</i>
Northern flicker	<i>Colaptes auratus</i>
Olive-sided flycatcher*	<i>Contopus borealis</i>
Western wood-pewee*	<i>Contopus sordidulus</i>
Hammond's flycatcher	<i>Empidonax hammondi</i>
Western flycatcher	<i>E. difficilis</i>
Purple martin*	<i>Progne subis</i>
Tree swallow	<i>Tachycineta bicolor</i>
Violet-green swallow	<i>T. thalassina</i>
Gray jay*	<i>Perisoreus canadensis</i>
Steller's jay*	<i>Cyanocitta stelleri</i>
Common raven*	<i>Corvus corax</i>
Mountain chickadee*	<i>Parus gambeli</i>
Red-breasted nuthatch	<i>Sitta canadensis</i>
House wren	<i>Troglodytes aedon</i>
Ruby-crowned kinglet*	<i>Regulus calendula</i>
Mountain bluebird*	<i>Sialia currucoides</i>
Hermit thrush	<i>Catharus guttatus</i>
American robin	<i>Turdus migratorius</i>
Warbling vireo	<i>Vireo gilvus</i>
Solitary vireo	<i>V. solitarius</i>
Yellow-rumped warbler	<i>Dendroica coronata</i>
MacGillivray's warbler	<i>Oporornis tolmiei</i>
Western tanager*	<i>Piranga ludoviciana</i>
Green-tailed towhee*	<i>Pipilo chlorurus</i>
Chipping sparrow*	<i>Spizella passerina</i>
Song sparrow	<i>Melospiza melodia</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
Dark-eyed junco	<i>Junco hyemalis</i>
Red-winged blackbird*	<i>Agelaius phoeniceus</i>
Brewer's blackbird*	<i>Euphagus cyanocephalus</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Cassin's finch*	<i>Carpodacus cassinii</i>
Red-crossbill*	<i>Loxia curvirostra</i>
Pine siskin*	<i>Carduelis pinus</i>





Rocky  
Mountains



Southwest



Great  
Plains

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Forest Service

## Rocky Mountain Forest and Range Experiment Station

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